REMARKS

Claims 34-36, 38-52 and 54-59 are pending. No new matter has been added. Reconsideration of the claims is respectfully requested.

Information Disclosure Statement

Applicants note that, in the returned copy of Form 1449 that accompanied the present Office Action, a number of references were crossed off for not having a date in the reference description. This indicates that the Examiner has not considered these references (MPEP 609). One of the references crossed off was Herzig (Micro-Optics Elements, Systems and Applications, Taylor and Francis, 1997). This reference forms the basis of the rejection under 35 U.S.C. § 103(a), and as such, clearly was considered by the Examiner. The Examiner is requested to provide a corrected copy of the 1449 form showing the Herzig has been considered.

Election/Restrictions

Applicants note that the Examiner has withdrawn claims 37 and 53 from consideration. Claims 37 and 53 depend respectively from independent claims 34 and 48. Applicants point out that claims 34 and 48 are generic, at least to Species 3 and 4, and respectfully assert that claims 37 and 53 will become allowable upon allowance of claims 34 and 48.

Claim Rejections under 35 U.S.C. § 102

Claims 34, 36, 41-44, 46, 47-49, 51, 52, 54, 55 and 59 are rejected under 35 U.S.C. §102 (e) as being anticipated by Feldman et al. (U.S. Patent No. 6,061,169) (Feldman). Applicants note that the rejection under 35 U.S.C. § 102(e) is improper, since Feldman was issued as a U.S. Patent before the filing date of the present application.

Feldman teaches an integrated micro-optical system including at least two wafers with at least two optical elements provided on respective surfaces of the at least two wafers. More particularly, Feldman teaches in Fig. 7 a slider block, in which a fiber (8) is inserted into the top wafer and a mirror (9) is integrated into the top wafer. Light from the

fiber is directed by the mirror down through the wafer stack. As it propagates down through the stack, the light passes through a first diffractive element (71), followed by a first refractive element (73), then a second diffractive element (75) and a second refractive element (77), to exit at the bottom of the stack (col. 7, lines 4-8). The light exits the stack at a magnetic coil (63) that is used as a magnetic recording head (col. 5, lines 32-40).

It should be pointed out that the second refractive element (77) has been mislabeled in Feldman's drawing as element "71". From the description at col. 7, lines 4-8, element 71 is clearly the first diffractive element that the light meets after reflection from the mirror. The lower element in FIG. 7 marked "71" shows a curved surface and clearly matches the description of the second refractive element (77). Furthermore, the number "77" is missing from the drawing. Accordingly, the only reasonable conclusion is that element 77 has been mislabeled as element 71 in the drawing.

To anticipate a claim, the reference must teach every element of the claim. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). Therefore, all claim elements, and their limitations, must be found in the prior art reference to maintain a rejection based on 35 U.S.C. §102. Applicants respectfully submit that Feldman does not teach every element of the rejected claims, and therefore fails to anticipate the claims.

The invention of amended claim 34 is directed to an optical system that includes a stack of at least two optical sheets. At least one the optical sheets includes a surface replicated with a micro-structured optical element and at least one three-dimensional optical element. The three-dimensional optical element has a vertical dimension of at least 100 μm relative to a replication base surface.

Feldman fails to teach the elements of claim 34. In particular, Feldman fails to teach a single surface that is replicated with both a micro-structured optical element and at least one three-dimensional element. Instead, Feldman shows, in Fig. 7, a stack of

three sheets separated by layers of bonding material (25). The upper surface of the upper sheet contains an angled mirror and the lower surface of the upper sheet contains the first diffractive element (71). The upper surface of the middle sheet contains the first refractive element (73) and the lower surface of the middle sheet contains the second diffractive element (75). The upper surface of the lower sheet contains the second refractive element (77) and the lower surface of the lower sheet contains the magnetic coil (63). None of Feldman's sheets contain more than one optical element on each surface.

Accordingly, Feldman fails to teach all the elements of claim 34, and claim 34 is not anticipated by Feldman and is allowable thereover.

Independent claim 48 is directed to an optical system that comprises a plurality of stacked optical sheets. Each of the stacked optical sheets includes at least one optical element replicated on a surface to define the optical circuit. An optical path within the plurality of stacked sheets passes from a first optical element on a first optical sheet of the plurality of stacked optical sheets to a first optical element on a second optical sheet of the plurality of stacked optical sheets and to a second optical element on the first optical sheet. Thus, according to the claim, the light passes from the first sheet to the second sheet and back to the first sheet.

Feldman fails to teach the elements of claim 48. In particular, Feldman fails to teach an optical system that has an optical path that leads from a first element on the first sheet to a first element on the second sheet and to a second element on the first sheet. Instead, Feldman teaches a device in which the light is transmitted from a first sheet to a second sheet and to a third sheet.

Since Feldman fails to teach all the elements of claim 48, claim 48 is not anticipated by Feldman and is allowable thereover.

Dependent claims 36, 41-44, 46, 47, 49, 51, 52, 54, 55 and 59, which depend from claims 34 and 48 and further define the inventions of claims 34 and 48, were also rejected under 35 U.S.C. §102(e) as being anticipated by Feldman. While Applicants do not acquiesce with the particular rejections to these dependent claims, it is believed that these rejections are moot in view of the remarks made in connection with independent

claims 34 and 48. Therefore, dependent claims 36, 41-44, 46, 47, 49, 51, 52, 54, 55 and 59 are also in condition for allowance.

Regarding claim 36, Feldman fails to teach a transmissive diffractive optical element replicated on the same surface as a three-dimensional optical element.

Regarding claim 43, Feldman fails to teach an optical sheet having an integrated spacer. Instead, Feldman teaches the use of bonding material (25) between sheets.

Regarding claim 44, Feldman fails to teach an optical path within the stack passing from a first optical element on the first optical sheet to a first optical element on the second sheet and to a second optical element on the first sheet. Instead, Feldman teaches that the light path passes from the first optical sheet to the second optical sheet and then through the third optical sheet. Feldman's optical path does not return to the first optical sheet after reaching the second optical sheet.

Regarding claim 46, Applicants respectfully assert that, although the magnetic coil is described by Feldman as an active element, it is incorrect to characterize a magnetic coil as an active optical element.

Regarding claim 47, Feldman fails to teach a passive optical element attached to a surface of one of the optical sheets. In Feldman's device, the surface of the optical sheet is shaped into a refractive or a diffractive element, and constitutes an integral part of the sheet. An optical element that is attached to the surface, on the other hand, is directed to an optical element that was not formed from the surface of the sheet, but which existed separately from the sheet and is now attached to the sheet.

Claim Rejections under 35 U.S.C. § 103

In paragraph four on page four of the Office Action, claims 35, 38-40, 45, 50, 56-58 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Feldman et al. (U.S. Patent 6,061,169) in view of Herzig ("Micro-Optics Elements, systems and applications", published by Taylor & Francis). It is stated that Herzig discloses methods of replication of micro-optical elements having heights ranging from 1 μm to over 1 mm, and that it would have been obvious to a person of ordinary skill in the art to utilize the replication methods of Herzig because such methods are suitable for mass production.

Three criteria must be met to establish a *prima facie* case of obviousness. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference. Second, there must be a reasonable expectation of success. Finally, the prior art reference, or combination of references, must teach or suggest all the claim limitations. MPEP § 2142. Applicant respectfully traverses the rejection since the prior art fails to disclose all the claim limitations and there would be no motivation to combine the references as proposed by the Examiner.

Herzig fails to remedy the deficiencies of Feldman discussed above. Claims 35, 38-40, 45, 50, 56-58, which depend from independent claims 34 and 48, and which further define the inventions of allowable claims 34 and 48, are therefore also allowable.

Furthermore, Herzig states at page 169, "However, current commercial moulding technology has in general not yet reached the combination of very high resolution (less than 1 micron) and structure depth (larger than 1 micron) required by many DOE microstructures. Individually, both types of structures are routinely produced commercially." In other words, Herzig states that it is difficult to replicate structures of both high resolution and large dimension at the same time, although structures of high resolution and structures of large dimension may each be molded individually. Understanding this would lead one of ordinary skill in the art to understand that it would become even more difficult to mold a surface that contains both small sized structures and three-dimensional structures. Therefore, Herzig teaches away from the idea of combining the replication of large scale and small scale structures on the same surface and so there would be no motivation to combine the references in the manner suggested in the Office Action.

Regarding claim 35, the proposed combination of references fails to teach or suggest an optical sheet having a surface replicated with a micro-structured optical element having a feature height of less than 10 μm and at least one three dimensional optical element.

Regarding claims 38-40, the proposed combination of references fails to teach or suggest an optical sheet having a surface replicated with a micro-structured optical element and at least one three dimensional optical element having a vertical dimension

of at least 100 μm, 500 μm or 1 mm. Instead, Herzig teaches that it becomes increasingly more difficult to mold surfaces where there is a larger disparity in the feature size of the elements on the surface.

Regarding claims 45 and 50, neither of the references teach or suggest that an optical path within the stack passes from a first element on the first sheet to a first element on the second sheet and then to a second element on the first sheet, where the first and second elements on the first sheet are on the same surface of the first sheet.

Regarding claims 56-48, neither of the proposed references, either individually or in combination teach or suggest an optical system having plurality of stacked optical sheets, where each of the sheets includes at least one optical element replicated on a surface, and where an optical path within the stack passes from a first element on the first sheet to a first element on the second sheet and then to a second element on the first sheet, where one of the optical sheets defines a sheet plane and has a surface replicated with an optical element having a dimension of at least 100 μm, 500 μm or 1 mm above the sheet plane.

Conclusion

In view of the amendments and reasons provided above, it is believed that all pending claims are in condition for allowance. Applicant respectfully requests favorable reconsideration and early allowance of all pending claims.

If a telephone conference would be helpful in resolving any issues concerning this communication, please contact Applicant's attorney of record, Iain A. McIntyre at 952-253-4110.

Respectfully submitted,

Altera Law Group , LLC

Date: March 3, 2003 By: _____

Iain A. McIntyre
Reg. No. 40,337
IAM/vlb